The Brocade SilkWorm 24000 Director provides a highly reliable and intelligent solution for enterprise-class Storage Area Networks (SANs) in mission-critical environments.

SILKWORM 24000 DIRECTOR

Highlights

- Delivers up to 128 ports in a single domain and a 14U enclosure with up to 384 ports in a single rack, facilitating more easily managed SAN fabrics with thousands of ports

- Meets ultra-high-availability requirements with redundant, hot-pluggable components, no single points of failure, non-disruptive software upgrades, and hot code activation

- Provides FICON® support for IBM zSeries server environments, including intermix mode on a port-by-port basis, cascaded FICON fabrics, 1 and 2 Gbit/sec FICON speeds, and CUP support

- Increases performance through reduced latency and Brocade Inter-Switch Link (ISL) Trunking

- Leverages intelligent Brocade SAN management and security tools to increase operational efficiency and maximize SAN investments

- Protects investments by enabling upgrade paths to future technologies, increased port speeds, IP connectivity, and more

A High-Port-Density, Multiprotocol Director for Enterprise SANs

With state-of-the-art performance and enhanced scalability for both open system and IBM zSeries server enterprise SAN environments, the Brocade® SilkWorm® 24000 Director provides unique capabilities to meet demanding mission-critical requirements. It scales non-disruptively from 32 to as many as 128 concurrently active 2 Gbit/sec full-duplex ports in a single domain or two domains of up to 64 ports each. In addition, it offers improved performance and the potential to upgrade to higher-speed connectivity in the future. The SilkWorm 24000 also leads the industry in power and cooling efficiency, helping to reduce total cost of ownership.

With its intelligent fourth-generation ASIC, the SilkWorm 24000 provides a reliable foundation for core-to-edge SANs, enabling fabrics capable of supporting thousands of hosts and storage devices (see Figure 1). Whether used as a core building block for an enterprise fabric or as a standalone director, the SilkWorm 24000 is a reliable, high-availability solution. These capabilities make it ideal for enterprise management and high-volume transaction processing applications such as ERP and data warehousing, as well as data backup, remote mirroring, and high-availability clustering.

The SilkWorm 24000 is designed to integrate with heterogeneous environments that include IBM zSeries server and open platforms with multiple operating systems such as Microsoft Windows, Linux, Solaris, HP-UX, AIX, and i5/OS. As a result, Brocade-based SANs can help serve as the foundation for implementing utility computing and Information Lifecycle Management (ILM).

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Figure 1. A SilkWorm 24000 core fabric surrounded by SilkWorm edge switches enables cost-effective, highly scalable enterprise SANs.
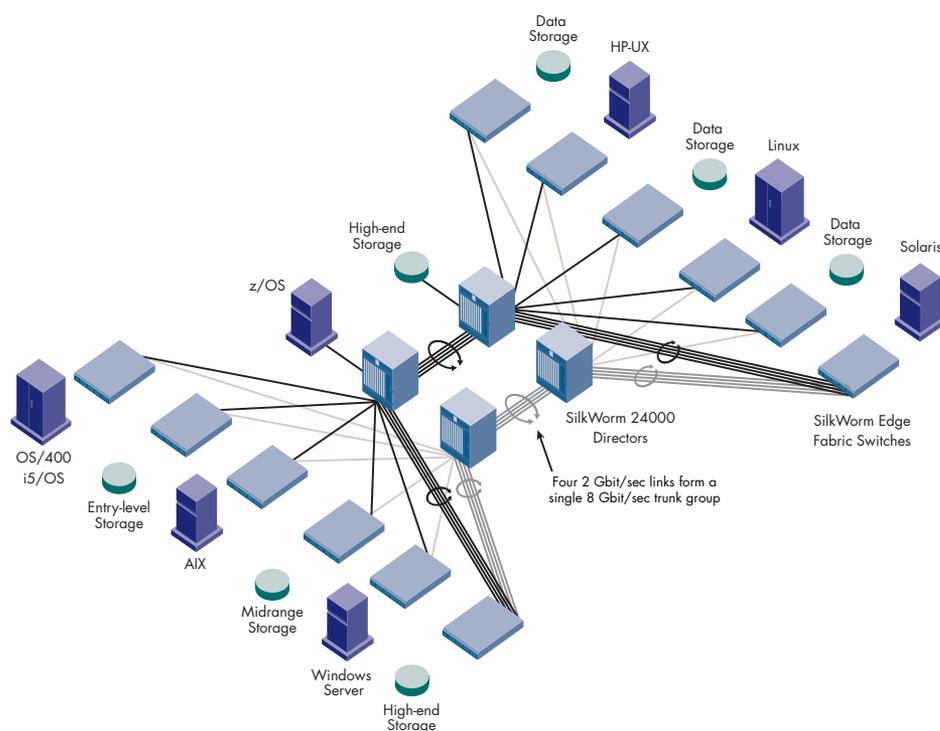
ULTRA-HIGH AVAILABILITY THROUGHOUT THE FABRIC

The core-to-edge SAN model features redundancy within the director as well as a high–availability network approach for the entire fabric. The ultra-high-availability features of Brocade Fabric OS® help provide a SAN infrastructure capable of delivering continuous overall system availability with features that include:

- Non–disruptive software upgrades and hot code activation
- Dual–redundant control processors with stateful failover
- Redundant, hot-swappable components and redundant power and cooling subsystems
- Continuous monitoring of environmental components
- Power-On Self–Test (POST), online/offline diagnostics, and per–port statistics
- Error detection and fault isolation facilities
- Call-home capabilities to provide remote notification of system events

A NEW LEVEL OF SAN SECURITY

To help protect valuable information, the SilkWorm 24000 supports Brocade Secure Fabric OS®, the most comprehensive fabric-based security platform available. Based on the latest networking security technology, Secure Fabric OS addresses a wide variety of vulnerabilities within the SAN fabric and helps prevent downtime due to human error.

INDUSTRY-LEADING PERFORMANCE

With a fully non-blocked architecture supporting 128 ports concurrently active at 2 Gbit/sec full-duplex, the SilkWorm 24000 supports the most demanding SAN applications at the core of large SANs. It employs a multistage shared memory architecture that reduces latency in port–to–port transfers to 2.1 microseconds or less.

To provide even higher performance, Brocade ISL Trunking with 2 Gbit/sec blades combines up to four ISLs between a pair of switches into a single, logical high-speed trunk running at up to 8 Gbit/sec. With 4 Gbit/sec blades, an ISL trunk can include up to eight ports for as much as 32 Gbit/sec of data throughput.

In addition, exchange-based Dynamic Path Selection (DPS) optimizes fabric-wide performance and load balancing by automatically routing data to the most efficient available path in the fabric. DPS augments ISL Trunking to provide more effective load balancing in certain configurations, such as routing data between multiple trunk groups for higher availability.

To support disaster recovery and business continuance operations, the SilkWorm 24000 with new 4 Gbit/sec blades enables unprecedented distances between servers and storage devices. Support for distances up to 500 kilometers at 1 Gbit/sec and 100 kilometers at 4 Gbit/sec at full bandwidth facilitates high-performance, long-distance SAN solutions for data replication and business continuance.

INTELLIGENT SAN MANAGEMENT AND MONITORING

The SilkWorm 24000 leverages Fabric OS, the embedded operating system, to centralize SAN management for greater efficiency. This approach enables heterogeneous device connectivity, automatic data routing, self-healing capabilities, and scalable connectivity options. To simplify daily SAN management, organizations can utilize a command line interface for automated scripting or the GUI-based Brocade Web Tools utility.

Organizations can also use Brocade Advanced Performance Monitoring to improve SAN performance tuning, resource optimization, and administrator productivity. Moreover, the Brocade Fabric Access API integrates with popular third-party storage management applications, enabling organizations to continue using their storage management tools of choice.

FICON SUPPORT FOR IBM ZSERIES SERVER ENVIRONMENTS

The SilkWorm 24000 supports the FICON protocol for IBM zSeries server environments, enabling organizations to run both open systems Fibre Channel and FICON traffic in intermix mode on a port-by-port basis within a single director. The Brocade FICON implementation also supports cascaded FICON fabrics and both 1 and 2 Gbit/sec FICON speeds, as well as the CUP in-band management protocol for use with SA/390, DCM, or RMF monitoring platforms.

UPGRADE PATHS FOR INVESTMENT PROTECTION

To help protect existing technology investments, the SilkWorm 24000 provides backward and forward compatibility with SilkWorm entry, midrange, and director offerings. Organizations can upgrade existing SilkWorm 12000 directors by replacing the port cards

and control processors, and can intermix SilkWorm 12000 and SilkWorm 24000 blades in supported configurations.

In addition, the SilkWorm 24000 is designed to support non-disruptive addition of 4 Gbit/sec Fibre Channel blades for performance and distance benefits. These capabilities help "future-proof" the SilkWorm 24000 for years to come. (For specific SilkWorm 24000 upgrade options, contact an authorized Brocade Partner or visit www.brocade.com.)

MAXIMIZING SAN INVESTMENTS

Brocade and its partners offer complete SAN solutions to meet a wide range of technology and business requirements. These solutions include education and training, support, service, and professional services to help optimize SAN investments. For more information, contact an authorized Brocade sales partner or visit **www.brocade.com**.

SILKWORM 24000 DIRECTOR SPECIFICATIONS

Systems Architecture

Fibre Channel ports	128 ports, universal (E, F, and FL); one domain per chassis at up to 128 ports or two domains per chassis at up to 64 ports each; up to eight 16-port Fibre Channel modules; up to 384 ports per 42U rack
Control processor	Redundant (active/standby) control processor modules
Scalability	Full fabric architecture 239 switches maximum
Certified maximum	Combination of 56 switches, 19 hops; larger fabrics certified as required; consult Brocade or OEM SAN design documents for configuration details
Interoperability	Any SilkWorm 2000 family switch, SilkWorm 3000 family switch, SilkWorm 4000 family switch, SilkWorm 200E, SilkWorm 12000, and SilkWorm 48000

Performance	2 Gbit/sec blades: 1.063 Gbit/sec line speed (full duplex); 2.125 Gbit/sec line speed (full duplex); auto-sensing of 1 and 2 Gbit/sec port speeds; optionally programmable to fixed port speed; speed-matching between 1 and 2 Gbit/sec ports 4 Gbit/sec blades: 1.063 Gbit/sec line speed (full duplex); 2.125 Gbit/sec line speed (full duplex); 4.25 Gbit/sec line speed (full duplex); auto-sensing of 1, 2, and 4 Gbit/sec port speeds; optionally programmable to fixed port speed; speed-matching between 1, 2, and 4 Gbit/sec ports
ISL Trunking	2 Gbit/sec blades: Up to four 2.125 Gbit/sec ports per ISL trunk; up to 8.5 Gbit/sec per ISL trunk 4 Gbit/sec blades: Up to eight 4.25 Gbit/sec ports per ISL trunk; up to 32 Gbit/sec per ISL trunk

SILKWORM 24000 DIRECTOR SPECIFICATIONS (CONTINUED)

Systems Architecture (continued)

Aggregate bandwidth	512 Gbit/sec end to end
Switch latency	<2.1 μsec any port to any port at 2 Gbit/sec, cut-through routing
Maximum frame size	2112-byte payload
Frame buffers	2 Gbit/sec blades: 108 per 4-port group, dynamically allocated 4 Gbit/sec blades: 1024 per blade, dynamically allocated up to 255 per port
Classes of service	Class 2, Class 3, Class F (inter-switch frames)
Port types	FL_Port, F_Port, and E_Port; self-discovery based on switch type (U_Port); optional port type control
Data traffic types	Fabric switches supporting unicast, multicast (255 groups), and broadcast
Media types	Small Form-factor Pluggable (SFP) media; short-wave up to 500 meters (1640 feet); long-wave up to 10 kilometers (6.2 miles); extended long-wave up to 100 km (62.1 mi); distance depends on fiber optic cable and port speed
Fabric services	Simple Name Server; Registered State Change Notification (RSCN); Alias Server (multicast); Brocade Advanced Zoning, FICON Control Unit Port (CUP), Web Tools, Fabric Watch, Extended Fabrics, Remote Switch, ISL Trunking, and Advanced Performance Monitoring

High Availability

Chassis power	Two AC-DC power supply modules, 2N redundancy
Cooling	Three blower assembly modules (two operational required)

Management

Management software supported	Telnet; RADIUS; SNMP (FE MIB, FC Management MIB); Web Tools; Fabric Watch; third-party applications utilizing Brocade Fabric Access API
Management access	10/100 Ethernet (RJ-45), in-band over Fibre Channel (requires fabric); two serial ports (DB-9) per control processor module
Diagnostics	POST and embedded online/offline diagnostics

Mechanical Specifications

Enclosure	Rear panel-to-door airflow
Width	43.74 cm (17.22 in)
Height	61.24 cm (24.11 in) for 14U
Depth	70.90 cm (27.90 in) without door 74.20 cm (29.20 in) with door
System weight	88 to 96 kg (193 to 212 lb)

Environment

Temperature	Operating: 0° C to 40° C (50° F to 104° F) Non-operating: -25° C to 70° C (-13° F to 158° F)
Humidity	Operating: 5% to 85% non-condensing at 40°C (104° F)
Altitude	Up to 3000 meters (9800 feet)
Shock	Operating: 20G, 6 ms duration, half-sine
Vibration	Operating: 0.5G p-p, 5–500 Hz Non-operating: 2.0G, 5–500 Hz
Heat dissipation	740 W, 2525 BTU/hr fully loaded

Power

Supported power range	Nominal: 200 to 240 VAC nominal, 5.0 A, single phase Operating: 180 to 264 VAC auto-sensing Maximum 2300 Volt-Amps Maximum 12 Amps
In-rush current	40 Amps maximum, peak
Frequency	47 to 63 Hz

Regulatory Compliance

Country/Region	Safety	EMI/EMC
Canada	CSA 60950	ICES 003 Class A
United States	UL 60950	FCC Part 15 Class A
Japan	IEC60950	VCCI Class A ITE
European Community	EN60950	EN55022 Level A
	TUV, NEMKO	EN55024
Australia/New Zealand		AS/NZS 3548 Class A
International	IEC 60950	CISPR 22 Class A

For information about supported SAN standards, visit www.brocade.com/sanstandards

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